MARKET PARTICIPATION AMONG CASSAVA VALUE CHAIN ACTORS IN RURAL BENIN

Gilbert Onionkiton Adjimoti, PhD Candidate University of Ghana

Abstract

In developing countries, market access is one of the means that can ensure the integration of producers in the national economy. For the majority of rural people who depend mainly on agriculture for their livelihood, access to market has always been a critical point of this transformation. Literature teaches us that three broad categories of constraints that may affect access to markets. These constraints vary considerably depending on the economic systems of governance and types of crops in each region and prevent people from taking full advantage of their activities at any stage of the value chain. This is the case of the cassava value chain in the Collines region in Benin. The region is one of the main areas of production and processing of cassavas in Benin. Its importance is best appreciated through the planted area, production but also all processing activities related (INSAE, 2013). The lack of synergy between different actors is a major obstacle to the creation of opportunities and the achievement of gains. A field survey using a structured questionnaire have been used to collect data from 150 different actors of the cassava value chain in the Collines region. Data analysis have been done using descriptive statistics and a multinomial logistic regression model. The multinomial logistic regression model is used to determine the factors that influence the choice of actors to the market. The result shows us that the majority of actors (67%) are using the informal market for their products. The lack of information, communities' collective actions and infrastructure can explain this situation. We also found that physical constraints such as access to information, road and transportation influence the market participation. On the same time this constraint increase the probability to choose informal market. Processors tempt to participate more in the formal market than producers.

Key words: cassava, market access, processors, producers, value chain

Introduction

Agriculture plays an important role in reducing poverty. According to the World Bank report (2009), the growth of the agricultural sector is twice more effective in reducing poverty in developing countries than growth in other sectors. In Benin, as in most developing countries, agriculture is an important part in the livelihoods of rural people. In recent years, producers in general and especially small farmers have faced considerable difficulties in practice and agricultural services. Market access is a real limit to the promotion of agricultural products. The markets are important in the subsistence strategy of most rural households. Not only because most of the production resources comes from the market but mostly it's the only way for producers to sell their product. It is also on the same market that they spend income earning from production. Market access also gives players the opportunity to specialize according to comparative advantages of ownership and therefore enjoy the trade earnings (Duncan, 2007).

It is therefore important to find a way of improving market participation for the value chain actors and especially those crops which have a high value for food security and nutrition security such as cassava. Over the years, cassava has demonstrate it importance in Benin in term of food security and nutrition. The measures in term of improving yield and soil fertility but actors involve in cassava value chain face a lot of challenges in term of market participation. This lack of market participation prevent the chain from performance and efficiency. Enhancement of market participation has been linked with various factors such as improved productivity, infrastructure growth and transaction cost as well as market access.

The objective of this paper is to access the factors influencing market participation for cassava value chain actors and which market do they prefer.

Literature review
Improving smallholder productivity has received much attention over the years and has led to a better understanding and design of technical and economic interventions resulting in the use of more productivity enhancing technologies. However, in the area of smallholder market integration, the reasons for low participation or otherwise of smallholders in markets are still not fully understood, resulting in a relatively weak policy and strategy choice for the smallholder (FAO, 2013).
Smallholder market access to and participation in markets is considered to be a key factor for poverty reduction in rural areas (IFAD 2006; IFAD 2010; Barret *et al* 2008; Yao, 2003; Alila, 2006). In an era of increasing demand for food and agricultural products, improving rural households' market participation is of utmost importance.

The limitations or barriers faced by smallholders in their decision to participate in markets have been discussed extensively in literature. These factors are generally

grouped into external and internal factors. The external factors are believed to be beyond the control of the smallholder farmer and these include population growth and demographic change, technological change and introduction of new commodities, development of the non-farm sector and the broader economy, changes in labour opportunity costs, macroeconomic trade and sectorial policies affecting prices and other driving forces (von Braun et al., 1991; Pingali and Rosegrant, 1995). For exempl Chamberlin (2013) found strong support for the importance of access to infrastructure and services on a range of market participation outcomes in Kenya and Zambia.

Other factors that could equally affect the decision to participate in markets and the extent of participation as spelt out by (Pender et al., 2006) include development of input and output markets, institutions, cultural and social factors affecting consumption preferences, production and market opportunities and constraints, agro-climatic conditions, and production and market related risks.

Factors such as smallholder resource endowments which include land, capital (physical and human), labour, are believed to be household specific and are therefore termed internal factors that influence market participation. Some key factors that are believed to influence market participation are discussed in the sections that follow.

A necessary condition for market participation by smallholder farmers is having something to sell. Smallholder farmers can however benefit from participating in the market only if they are able to produce a certain level of market output. Achieving this goal however has been a major challenge since most smallholders have a very low level of output.

Barret (2008) indicated that only improving markets for smallholders does not necessarily lead to market participation, but there is the need for smallholders to have access to productive technologies and adequate private and public goods in order to work at producing a marketable surplus. Productivity, can therefore, play an important role in determining a household's decision and extent of participation in the market.

Increased commercialization of agriculture or participation in markets has been a central part of increasing rural household incomes and improving living standards in many developing countries (Strasberg *et al* 1999). It is argued that commercialization, can positively affect productivity through specialization (better resource allocation) and intensification (increased use of inputs). Various studies have been conducted to enhance this argument. In a study conducted by Jayne *et al* (1994), it was found that, there is a positive correlation between household agricultural commercialization and productivity. This confirms earlier assertions made by Owour (1999) and Odhiambo (1998) that established a positive relationship between these two variables.

Empirical analysis of the determinants of smallholder market participation has to deal with the econometric hazard of selection bias (Heckman, 1979). The problem arises because households (or individuals) face different types of decisions in relation to market participation – a discrete decision over whether or not to participate in a given market as

either a buyer or a seller, and a continuous decision as to how much to buy or sell conditional on market participation. Variables affecting the latter, continuous decision may affect the discrete participation decision while some factors – e.g., fixed costs of market participation due to transport costs or vendor license fees – that affect the discrete participation decision will not, in theory at least, affect the continuous decision. If unobserved preferences (e.g., risk aversion) or characteristics (e.g., liquidity constraints) affect both decisions, then regression estimates of the continuous choice will yield biased estimates absent correction for the first-stage participation choice.

One of the factors that has been identified over the years to be responsible for market failures in most instances and a major barrier to market participation is transaction cost (de Janvry, Fafchamps and Sadoulet, 1991). Various studies have shown that transactions costs is a major determinant of households' decisions on market participation (Goetz, 1992; Sadoulet and de Janvry, 2000; Vikas, Sadoulet, and de Janvry, 2003; Carter and Olinto, 2003; Vance and Goeghegan, 2004; and Barret, 2008).

Barrett (2008), noted that transaction cost to some extent distorts production. Also in explaining the role heterogeneity of smallholders play in their decision to participate in markets, transaction costs, as well as differential access to assets and services to mitigate transaction costs, help in this regard. Transaction costs can be categorized under two sub headings: fixed transaction costs (FTC) and proportional transaction costs (PTC). The major factor that differentiates the two is that FTCs are mostly determined based on information variables, while PTCs are determined by distance and transport variables. The main differentiating factor between the two transaction costs is that FTCs are determined based upon information variables, while distance and transport variables are expected to determine PTCs (Alene *et al.*, 2008).

The main barriers affecting the long-term ability of smallholders to supply global markets are market access constraints and supply side constraints. These constraints are well known and have been discussed widely in the literature (Hayami and Ruttan 1971; McNamara 1973; Lele 1975; Rola-Rubzen and Hardaker 1999; Rola-Rubzen, Hardaker and Dillon 2001). The constraints faced by farmers can generally be summarized into the following. The first two are related to supply side constraints; and the last to both supply and demand constraints.

- *physical constraints (such as poor roads and infrastructure, lack of storage facilities, poor communication and other infrastructure that adversely affect their terms of trade);*
- *capacity constraints (such as lack of credit and financial services that inhibit them from improving their productivity, lack of access to inputs and other agricultural technologies, lack of organizational support, lack of skills and knowledge on new technology that would increase their production, poor knowledge of market requirements such as quality, health and safety standards); and*

- *political constraints such as domestic policies that disfavour the agricultural sector (red tape and overly restrictive legal frameworks; excessive licensing requirements; poor legal framework to support farmers such as contract enforcement) and trade policies that distort the real exchange rate, turning the terms of trade against agriculture.*

To improve the ability of smallholders to participate in emerging markets, these constraints need to be addressed.

Cassava Production, processing and marketing

Cassava is the most cultivated and consumed root plant in most rural and urban areas. It grows in all departments of the country except the coastline which is limited to Cotonou. Based on food consumption trends over the last decade, cassava appears as the second source of carbohydrate in Benin after maize. This crop has the double advantage of being both a food and cash crop. The importance of cassava resulted in the establishment of a number of projects and programs for the promotion of root and tuber crops including cassava. The actions of these various projects, including improved performance and the prospect of a diversified use of cassava in food processing for the production of bread flour, starch and drinks (alcohol and syrup cassava) allowed a renewed interest in this speculation.

The regional demand for products derived from cassava remains enormous and nothing suggests a reversal of this trend in the coming years. The region of Collines in Benin is one of the largest areas of cassava production as shown in the figure below. The region has set since 2007 among the three largest producing regions of cassava. This reflects the importance of culture, especially in matters of nutrition and food security. The figure shows that cassava production has increased on averaged from 2002 to 2012. However irregular's variations were observed during this period.

Figure 1: Cassava production in three Benin region
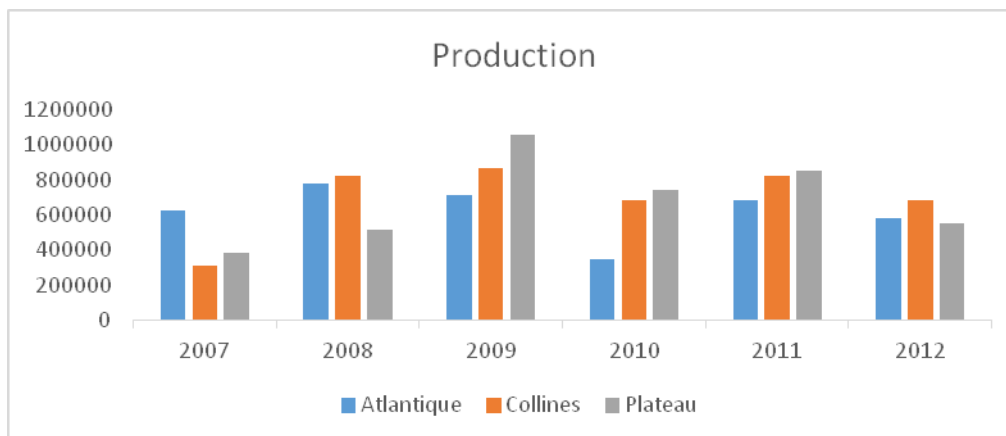
Source: INSAE, 2013

Figure 2: Production trend from 2002 to 2012
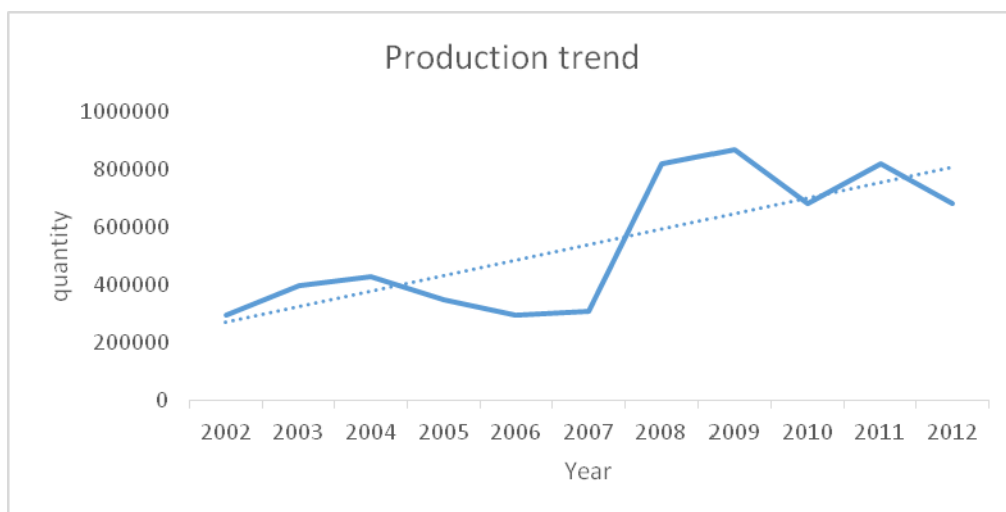
Source: INSAE, 2013

Cassava processing is carried out exclusively by individual women or group using traditional technologies using little or no mechanical equipment. This method of processing is intended primarily for the manufacture of food derivatives led by Gari (65% of the crop) and lafun (5% of the crop). Semi-industrial and industrial units are

very recent and forward-alcohol production and cassava starch. Production capacity exceeds domestic demand, but they have difficulty in meeting the requirements of the market in terms of quality and packaging. The ability to export marketing is almost non-existent in these units. Cassava and its derivatives are very demand mainly because of their nutritional value and contribution to food security. There is also demand for industrial and pharmaceutical needs.

Formal and informal markets

The situation of agricultural product markets in rural areas in Benin is insecure and does not allow producers and actors to get profit. Lack of vertical linkages in the marketing channel often leads actors to opt for the informal market (Wynne and Lyne, 2003). Before choosing the type of market, the actors first check the costs of transactions and profits associated. The combination of all these factors that many prefer informal channels for the flow of their products. These informal markets include the pre-harvest negotiations/contract between buyers and sellers. We will call informal markets because this is beyond the formal sales channel and cannot be recognized in the regional statistics. This market seem like a traditional supply chain where consumers typically buy most of their food from small independence retailers. Formal markets are the direct confrontation circuits sellers and buyers in a local or regional location known by all.

Data and Methods

A field survey using a structured questionnaire have been used to collect data from 150 different actors of the cassava value chain in the Collines region. The data involved 60 producers, 50 processors and 40 resellers. This distribution reflects the importance of each actor in the value chain. This sample have been randomly using the information collected from the producers and processors associations.

Data analysis have been done using descriptive statistics and a multinomial logistic regression model. Equity is measured by the ratio between the net profit and the total cost of transactions.

The multinomial logistic regression model is used to determine the factors that influence the choice of value chain actors to the market. It was chosen because the actors are here in front of more than two choices (Hill et al, 2001). They may decide to participate in the formal market, they can also choose to participate in the informal market, and finally, they may decide not to participate at all in the market. First, they are supposed to choose whether to participate in the market or not. When they choose to participate, they must decide whether it is formal or informal market. This choice is based on the maximization of producer's utility subject to technical and institutional factors. This function may be present in the following form:

Max U= U (C_j, B_{fj}, B_{ij}, X_v)

C_j represents the consumption of goods produced by the household;

B_{fj} represents the wealth gains from participation in the formal market;

B_{ij} represents the wealth gains from participation in the formal market;

X_v represents all other factors that may affect the utility.

In the utility function, the amount of good j which is consumed or sold shall not exceed the amount produced. According to Hill et al (2001), producers make their decision to participate or not in the market based on options that maximizes their utility. The multinomial logit model is of the form:

Ln (Pi/(1-Pi)) = a0+ a1X1+ a2X2+…………..+anXn+ e

Pi is the probability to not participate in market

1-Pi is the probability to participate in market

(a1……an)= logistic regression coefficient
(X1..…Xn) = independent variables

Market participation choice: formal markets, informal markets and no participation has been set as the dependent variable. The non-market participation is set as reference; therefore, it take the value of zero. Informal market participation take the value one and formal market participation take two.

Table 1: Variables definition

variables	Description
sex	Sex of the respondent: it take 0 for women and 1 for men
age	Age of the respondent
info	It measure the farmer access to information. It take 1 if the farmer have access to market information and 0 if not.
exten	Access to extension services. It take 1 if the farmer have access to extension services and 0 if not.
transp	Mean of transportation to the sale place
contra	Existence of pre-contract with buyers. It take 1 if the farmer have a pre-contract with the market actors and 0 if not.
memb	Group membership. It take 1 if the farmer belong to any group and

	0 if not.
roinfra	Road infrastructure
mainfra	Access to Market infrastructure
dislocal	Distance to local market
discentr	Distance to the central market
credit	Access to credit. It take 1 if the farmer have access to credit and 0 if not.
educa	Level of education
stora	Access to storage facilities
tax	Amount of tax pay to the market
activ	It design the type of activity. It take 0 for producers and 1 for processors.

Results

Market value chain for cassava
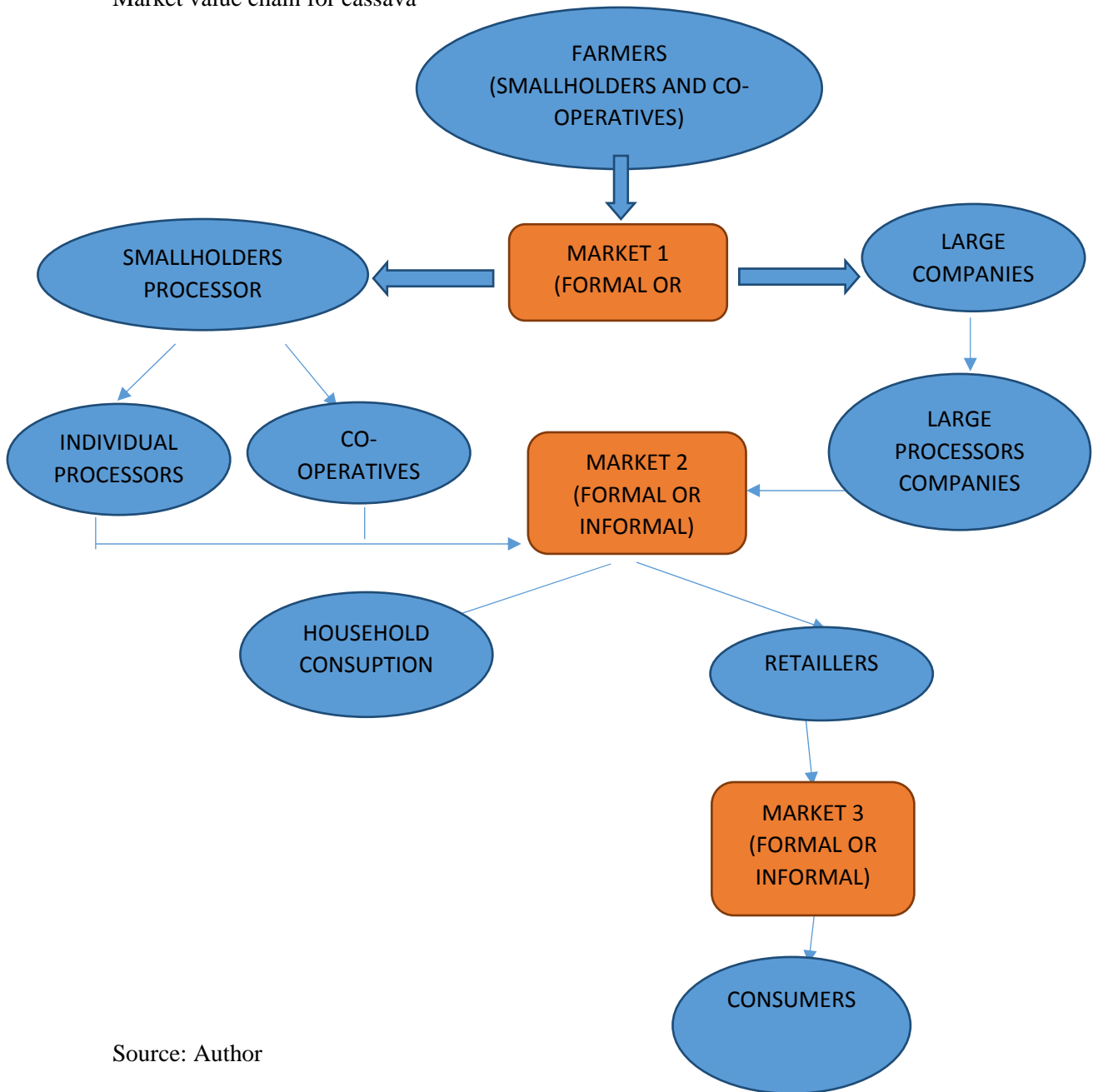
Source: Author

The value chain analysis shows that cassava production is provided by smallholder's farmers and women in cooperative. We noted however that small producers represent the majority and associate cassava crop with other cereals. Only few women cooperatives in manage exclusively to the cultivation of cassava. There is no large producers in the area. Whether formal or informal, these raw materials are trading on a market. Other producers such as cooperatives and individual producers process directly the crops themselves. Small processors and large processors who are not involved in the production also come on the market to procure fresh cassava for processing.

After processing, the resulting products are then exchange formally or informally on the markets. In these markets, consumers and retailers may then come to buy to products. Retailers can finally sell them to other consumers.

Table 2: Multinomial logit result

Variables	Formal market			Informal market		
	Coefficient	Std error	Prob	Coefficient	Std error	Prob
sex	0.042	0.295	0.122	0.256**	0,012	0.031
age	0.247	0.504	0.256	-0.021**	0.008	0.017
Age^2	0.301	0.258	0.182	0.968**	0.308	0.025
info	0.209***	0.005	0.000	0.201***	0,042	0.007
exten	-0.001**	0.001	0.019	0.089	0,013	0.368
transp	0.052***	0.002	0.000	1.354**	0,090	0.000
contra	0.106	0.149	0.172	0.261*	0,065	0.085
memb	0.110*	0.014	0.094	0.255**	0,026	0.018
mainfra	-0.073	0.096	0.202	0, 009	0,265	0.996
dislocal	-0.132***	0.058	0.003	0, 020	0,031	0.122
discentr	0.009	0.021	0.457	0, 009*	0,375	0.084
credit	0.167	0.129	0.200	0, 078***	0,282	0.000
educa	-0.076	0.056	0.140	0, 207	0,234	0.184
stora	0.059***	0.015	0.005	0, 206	0.308	0.208
tax	-0.049**	0.013	0.007	0, 024	0.013	0.301
activ	0.276**	0.033	0.014	-0, 357*	0.135	0.054
const	0.245***	0.104	0.004	0.205***	0.029	0.001

Number of observations:	150
Log pseudo likelihood:	-189.48
LR chi2(15)	287.25
Prob > chi2	0.000
Pseudo R^2	0.51

*Significant at 10%, **Significant at 5%, ***Significant at 1%

Source: Author

The regression results show that the model is globally significant (Prob> chi2 = 0.000). Through these results, we also found that socio-demographic variables were not significant for participation in the formal market. On the other hand, age and gender are significant for the informal market. The signs of the age and age squared coefficients shows that young people do not like to participate in informal markets unlike the elderly. The coefficient of the gender variable is positive, it mean that men have a preference for the informal market.

Regarding the variables reflecting physical constraints, access to information has a positive and significant influence on participation in the two markets. This would mean that improved information sources involved in value chain will result in active participation in two steps. Access to transport means is only significant for the formal market. It sign indicate that the access to the means of transport improves participation in the formal market. It is not significant to the informal market. This could be explained by the fact that generally informal markets in rural areas are negotiated directly between the seller and the buyer and in most cases the buyer moves to the seller. The distance to the local market negatively affects participation in the formal market, but is not significant for the informal market. Similarly, the distance from the central market positively influences participation in the informal market. Finally, access to the storage means positively influences participation in the formal market.

For capacity constraints, access to credit is significant for the informal market. This is understandable because the informal credit system or pre-harvest contracts are highly developed in the study area. So, this also led to informal market contracts. The existence of pre-production contract between the seller and the buyer is significant and positive for the informal market. The pre-production contracts generally allow producers to find an outlet for their product and at the same time, access to informal financing. Access to extension and advisory services positively influences participation in the formal market but do not have an influence on the informal market. Belonging to a group or association positively influences participation in two markets. This points directly demonstrate the role of collective action on market participation. The amount of taxes reduce participation in the formal market and increase that of the informal market. In other words, higher taxes deters players from the formal market to informal markets.

Finally, the type of activity in the chain also has an influence on the type of market. The results show that the processors have a preference for the formal market while producers prefer the informal market. This can be explained by the fact that producers have mostly informal contracts with buyers. This is not necessary the case for processors.

Conclusion

In Benin, the biggest constraints to market access are primarily physical. Because of the importance of the of the cassava value chain to the household food and nutrition security, improved market access conditions for the value chain actors will contribute to better achievement of the first millennium development goal. The development of informal markets in rural areas sometimes cause losses for actors and does not allow to plan purchases and sales. This development is usually led by the high transaction cost for sellers. This research involved only local players in the cassava value chain. It allowed us to see the most dynamic channel creation of values added and understand how local actors interact in the chain. A general lack of rural infrastructure and modern storage facilities led cassava value chain actors' to prefer informal methods of selling products. Rural Benin are characterized by poor infrastructure development. More than 65% of villages are more than a mile walk from the nearest market. The situation of the roads make that access to markets is very difficult in the rainy season. Rural roads are the main network of collection and disposal of agricultural products. Two keys issues need to be address which are investment in rural infrastructure and technology adoption.

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